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Innovative Arduino Accident Prevention Technology

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Abstract: *This paper proposes developing a system aimed at enhancing vehicle security and preventing unauthorized occupation. In situations where the driver may be less aware, such as when those are fatigued or under the influence, it can be challenging to maintain vigilance over one's own safety. By equipping all vehicles with an automated system that provides drivers with a high level of protection and alerts, we can significantly improve overall safety. This system includes an alcohol sensor and an eye blinking sensor installed within the vehicles. Upon starting the engine, these sensors automatically detect eye blinking patterns and test the alcohol level in the driver's breath. If the values exceed predetermined thresholds, the system emits alerts such as vibrations and flashing LEDs. Additionally, the vehicle is gradually brought to a stop automatically when signals received from the alcohol or eye blink sensors through the relay module. Furthermore, the system incorporates an MPU6050 sensor to monitor the car's position. If there are changes in the car's angle, calls are sent via the GSM module, allowing emergency services to track the vehicle. In summary, this system aims to enhance vehicle security by integrating advanced sensors and alert systems, despite facing certain inherent limitations and flaws during the implementation process.*

Keywords: Alcohol tracker, led, arduino, eye twitch sensor, MPU6050, L298 driver, GSM module.

I. INTRODUCTION

Driver failures pose significant risks on the roads today, leading to numerous accidents and affecting both drivers and bystanders. Common causes include intoxication, drowsiness, and vehicle tilt. To tackle these challenges, we utilize three sensors: an eye twitch sensor, MQ2 sensor to detect intoxication, and MPU6050 for monitoring vehicle tilt. The GSM module enables us to send messages to emergency services, aiding in tracking the car's location.

The Government of India, in collaboration with the Ministry of Road Transport and Highways, aims to halve the system integrates an MPU6050 sensor to monitor the car's position. If there are any changes in the car's angle, the GSM module sends calls, enabling emergency services to track the vehicle's location. accidents and fatalities by 2022. Globally, car accidents remain a major safety concern, with India witnessing nearly 5 lakh road accidents in 2015 alone. the system integrates an MPU6050 sensor to monitor the car's position. If there are any changes in the car's angle, the GSM module sends calls, enabling emergency services to track the vehicle's location.

II. LITERATURE REVIEW

- 1) Upender and Mari Sowmya proposed "Embedded computer control system for service mobile robots" likely involves the design of control system for mobile robots intended for service- oriented tasks. aims to create a robust and versatile control for mobile robots, enabling them to perform various service- oriented tasks autonomously or under human supervision.
- 2) Tushara, D, & Vardhini Karth proposed a Wireless vehicle alert and collision prevention system design using microcontroller, focuses on developing a system to enhance vehicle safety. It utilizes Atmel microcontroller technology along with wireless communication to detect potential collisions and alert drivers accordingly. Key components include sensors for obstacle detection, an Atmel microcontroller for data processing and control
- 3) K. Sainath & M. Sritej proposed a "Embedded computer control system for service mobile robots" likely involves the design and implementation of a control system for mobile robots intended for service- oriented tasks. aims to create a robust and versatile control system for mobile robots, enabling them to perform various service-oriented tasks autonomously or under human supervision.
- 4) K. Akkaya and M. designed a vehicle alert and collision system design using microcontroller, focuses on developing a system to enhance vehicle safety. It utilizes Atmel microcontroller technology integrated with wireless communication to detect potential collisions and alert drivers accordingly. Key components include sensors for obstacle detection, an Atmel microcontroller for data processing and control, and wireless modules for communication.

III. METHODOLOGY

The essential step of this paper is for diminish the mishaps, this mischance avoidance framework with eye jerk, liquor sensor, MPU6050, it can seed genuine mishaps for different reasons and some of timepassing since numerous drivers can't control the vehicles. Different components included in car collisions such as tanked driving, overspeed, other diversions such as texting whereas driving, talking to others, playing with children, conjointly sendsmessages through GSM. Table.1: Software and Hardware Requirements

Category	Component	Function
Hardware	Arduino Uno R3	Control and Communication
	DC Motor	Replaces vehicle
	GSM Module	Sends alerts via texts and calls
	Eye twitch sensor	Detecting motion of an eye
	Alcohol sensor	Detecting alcohol of the person
	Buzzer	Indicate color change
	MPU 6050	Detecting Angle of vehicle
Software	Arduino IDE	Code Development

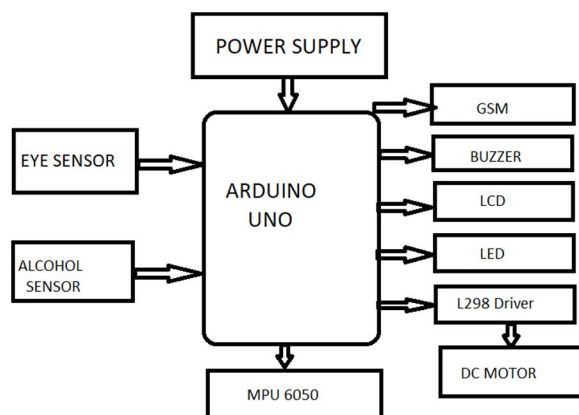


Figure.1: Block Diagram

The proposed vehicle security system entails several crucial steps. Initially, the installation of essential sensors, including the alcohol sensor, eye blinking sensor, and MPU6050 sensor, is imperative across all vehicles. These sensors must then be integrated with the vehicle's engine system to activate upon ignition. Next, thresholds for alcohol levels and eye blinking patterns triggering alerts need to set, a process demanding meticulous calibration and testing for accuracy. Alert mechanisms, such as vibrations and flashing LEDs, are subsequently implemented to activate when sensor thresholds are exceeded, ensuring immediate driver attention. Moreover, automated response mechanisms are developed to gradually bring the vehicle to a stop if impairments are detected, safeguarding against potential accidents. Integration with a relay module facilitates seamless communication between sensors and the vehicle's systems, while the setup of a GSM module enables transmission of signals to emergency services in the case of significant changes in vehicle angle, indicating a potential accident. Rigorous testing and calibration are conducted to ensure the system's functionality and accuracy, with ongoing maintenance and updates essential for sustained efficacy.

Finally, comprehensive training and education are provided to drivers to facilitate proper utilization and response to system alerts, emphasizing the critical role of vehicle security and safety on the roads. Through meticulous implementation, this system stands to significantly enhance vehicle security and prevent unauthorized occupation, ultimately advancing overall road safety.

IV. RESULTS AND DISCUSSION

The result are user-friendly, technologically advanced detection framework that optimizes costs, prioritizes security, and embraces sustainability, providing a more reliable and efficient for citizens. The future work aims to break barriers by creating a accident prohibition system that is accessible to everyone.

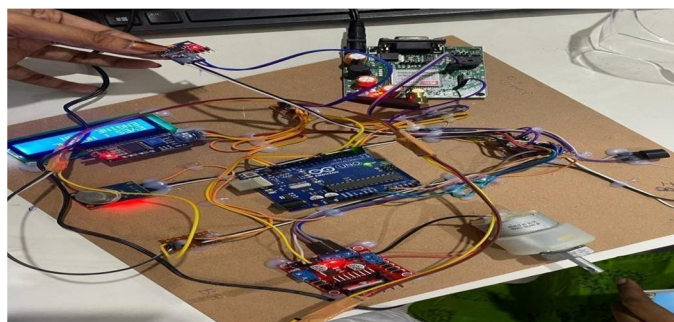


Figure.2: Manual Operation by MPU6050

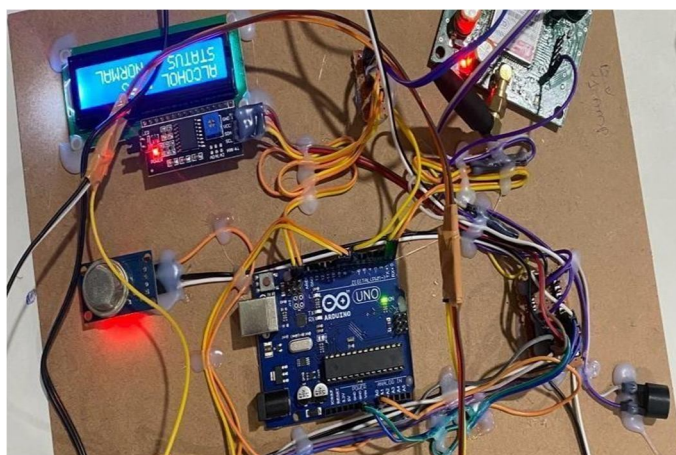


Figure.3: Manual Operation by Alcohol sensor

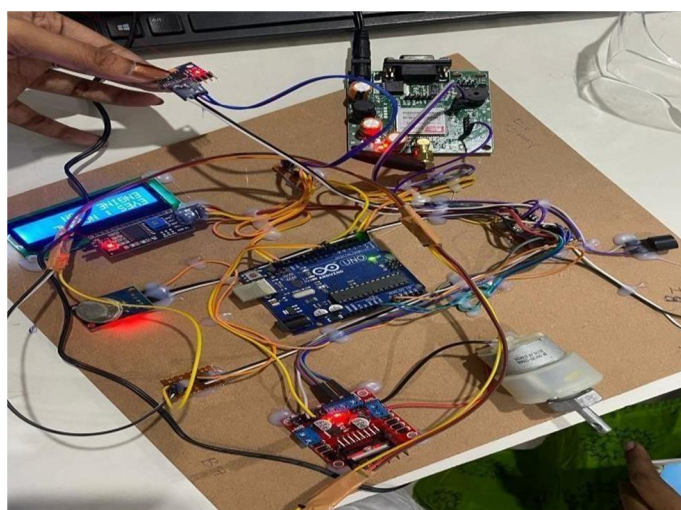


Figure.4: Manual Operation by Eyetwitch sensor



V. CONCLUSION

In conclusion, the system proposed marks a significant leap in vehicle security, using advanced sensors and alerts to combat driver fatigue and impairment risks. By integrating alcohol and eye blinking sensors with automated responses, it offers a strong defense against unauthorized occupation and accidents. Despite implementation challenges, its potential to boost road safety is noteworthy. This underscores the urgent need for such innovations, which can dramatically cut accidents and save lives.

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